

# Changes for All Buildings

September 4, 2003 Committee Hearing



## Time Dependent Valuation

- TDV energy replaces source energy throughout the Standards and the ACM manuals.
- Favors peak energy savings measures over off-peak measures
- Joint Appendix III explains the TDV values.



## Federal Appliance Standards

- Air conditioner minimum SEER becomes 12.0 Btu/W for equipment less than 65,000 Btu/h
- Water heater energy factor (EF) increases by 0.05, e.g., Standards for 50 gallon water heater goes from 0.53 EF to 0.58 EF.



## ACM Joint Appendices

- I. Glossary of Terms
- II. Climate data and design conditions
- III. Time Dependent Valuation (TDV)
- IV. Construction Assemblies



# Residential Buildings

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## Efficient Lighting

- High efficacy luminaire (HEL) defined
- Applies to hard-wired lighting.
- Kitchens – half of wattage must be HEL. Non HEL must be switched separately.
- Bathrooms, utility rooms, garages, laundry rooms – HEL or occupant sensors required
- Other spaces – HEL, occupant sensors or dimmers required
- Exterior – HEL or combined photosensor/motion sensor
- Lights recessed in insulated ceilings shall be type IC and airtight



## Duct Insulation

- R-8 required in climate zones 14, 15, and 16 (extreme climates)
- R-4.2 required in 6, 7, and 8 (mild climates)
- R-6 in other climate zones.



# Hot Water Pipe Insulation

- Required between the water heater and the kitchen





## Multi-family Loopholes Closed

- No credit for reduced glazing areas below the prescriptive limit of 20% of the floor area
- No credit for central water heating systems
  - The standard design assumes a central system when the proposed design has one



## Window Replacements

- The prescriptive fenestration performance requirements apply for window replacements in existing buildings.



## Duct Sealing in Existing Buildings

- New space conditioning ducts shall be sealed in Climates 2, 9-16 and insulated per Package D.
- Requires ducts to be sealed in Climates 2, 9-16 when a space conditioning system is installed or replaced.
  - Includes replacement of the air handler, cooling coil, heating coil, or furnace heat exchanger
  - Exception for replacement of outdoor unit
  - Exception for when ducts were previously diagnostically tested.



## New Compliance Options

- High quality insulation installation
- Properly sized air conditioners
- Efficient AC fan motors
- Ducts buried in attic insulation
- High EER Air Conditioners



## Third Party Verification

- Changes made to encourage quality installation with field verification
- Measures requiring third party testing and verification are grouped
- Improved protocols and procedures



# Nonresidential Buildings

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## Cool Roofs

- Cool roofs are a prescriptive requirement for low-slope roofs
- Trade-off procedures treat reflectance and emittance as continuous variables
- CRRC-1-2002 shall be used to determine reflectance and emittance
- Durability standards apply for liquid applied coatings
- Prescriptive requirement applies to low-slope re-roofing jobs of more than 2,000 ft<sup>2</sup>, with exceptions



## Acceptance Requirements

- Requires basic “acceptance testing” for equipment prone to be installed improperly
- ACM NJ-2005 is added to the Nonresidential ACM.
- References to the acceptance requirements are sprinkled throughout the standard where they apply.





## Demand Control Ventilation

- Sensors vary OA ventilation in spaces with varying occupancy like conference rooms, dining rooms, lounges, and gyms.
- Exception for classrooms.
- Acceptance requirements apply for all installations.
- Mandatory requirements for DCV sensors controls.



## Insulation Over T-bar Ceiling

- Insulation over lay-in ceiling tiles is prohibited unless the plenum height above the ceiling is greater than 12 ft and the conditioned space is less than 2,000 ft<sup>2</sup>.
- U-factors for insulated suspended ceilings are published in Joint Appendix IV and consider air leakage and thermal bypasses



## Relocatable Public School Buildings

- Climate independent criteria are added so relocatables can be moved anywhere in the state
- Climate zone specific option available also
- Labels used to keep track of climate zone
- Moving a relocatable public school building does not trigger alteration requirements
- ACM ND-2005 is added, which explains performance approach for relocatables



## Duct Sealing and Insulation

- R-8 mandatory minimum duct insulation for ducts in unconditioned spaces and outdoors
- Duct sealing to 6% maximum leakage (tested) for small single zone systems with >25% duct area in unconditioned spaces or outdoors.
- Duct sealing requirements are triggered in existing buildings when air conditioning units are replaced.





## Lighting

- Lighting power limits are lowered to encourage new, more efficient equipment
- Whole building and area category tables include a few new building types and area categories
- Lighting control changes
- Bi-level control credits for:
  - Hallways of hotels/motels.
  - Commercial and industrial storage stack areas (max. 2 aisles per sensor).
  - Library stacks (maximum 2 aisles per sensor).
- Other details
  - Retail restriction to single tenant for complete building method
  - Tailored method simplified
  - Acceptance requirements for lighting controls

## Prescriptive Requirements for Skylights

- Skylights are required for large, low-rise enclosed spaces more than 25,000 ft<sup>2</sup> and with greater than 15 ft ceiling height
- Automatic lighting controls required to shut off electric lights when daylight is available



## Thermal Breaks for Metal Roofs

- The prescriptive R-value method may not be used for metal building roofs
- Continuous insulation or thermal break required between metal roofs and metal framing members



## Efficient Space Conditioning Systems

- Cooling towers
- Water cooled chillers required for plants larger than 300 tons (air cooled chillers limited to 100 tons).
- VFD required for fan motors larger than 10 hp and pump motors larger than 5 hp
- Temperature reset controls chilled and hot water systems.
- Electronically-commutated motors required for series fan powered mixing boxes





## Unconditioned Buildings

- Lighting requirements now apply
- Warehouses
- Parking garages



# Compliance Options

## ● Gas cooling

- New mandatory requirements for gas-engine heat pumps and AC units (§112).
- New modeling rules for gas-engine heat pumps and AC units are added to the ACM.

## ● Underfloor air distribution



## Other Changes

- Retail schedule added to ACM manual
- 40% limit on west facing fenestration
- Insulation installed above roofing membrane must be low water absorption type
- NFRC label certificates for site-built fenestration > 10,000 square feet
- Adjustments to fenestration SHGC and U-factors to correspond with changes in NFRC test procedure
- Modeling of air conditioners at peak temperatures improved



# Outdoor Lighting and Signs

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## Power Limits – General Site Illumination

- Hardscape areas, automobiles, including parking lots
- Hardscape areas, pedestrian – two methods (linear feet of path and area methods)
- Building entrances
- Outdoor sales lots



## Power Limits – Specific Application

- Building facades
- Outdoor sales frontage
- Vehicle service station with or without canopies
- Other sales canopies.
- Non-sales canopies
- Ornamental lighting



## Lighting Zones

- LZ1 - State and national parks, recreational areas, wildlife preserves, special districts within LZ2 identified by local jurisdiction for lower ambient brightness.
- LZ2 – U.S. Census rural areas, special districts within LZ1 for higher brightness or LZ3 for lower brightness.
- LZ3 - US Census urban areas, special districts within LZ2 for higher brightness.
- LZ4 - special districts within LZ3 identified by local jurisdiction for high intensity nighttime use.
- Special local districts up to 20% of dry land area

Lighting Zones



## Controls

- Photoelectric switch or astronomical time switch
- For building facades, parking lots, sales and non-sales canopies, and all outdoor sales areas, an automatic time switch shall be installed that
  - Turns off the lighting when not needed and
  - Reduces the lighting power (in watts) by at least 50% but not exceeding 80%.

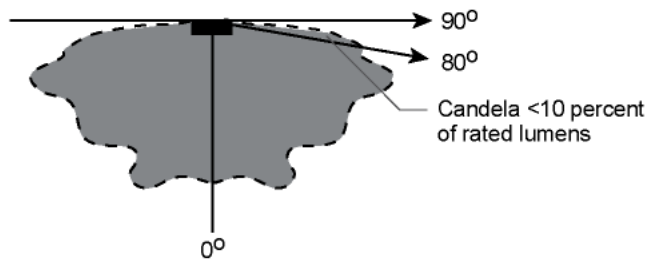




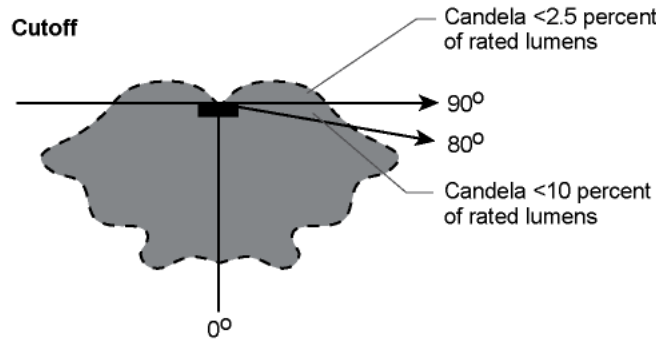
# Cutoff Luminaires

- Requires “cutoff” luminaires in some applications for 175W and larger lamps

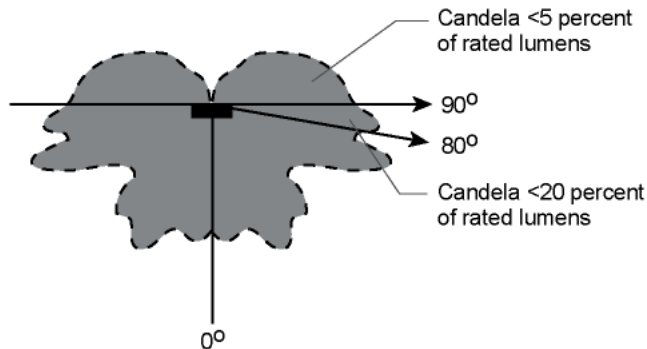
**Full Cutoff**



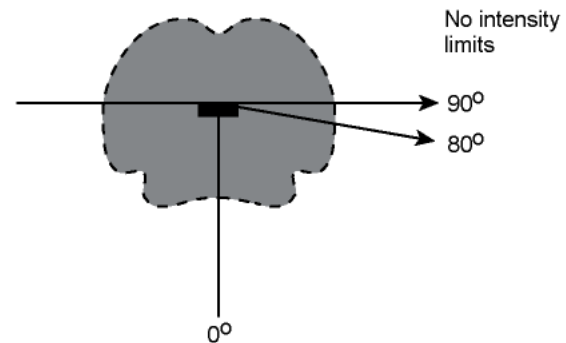
**Cutoff**



**Semicutoff**



**Noncutoff**



## Signs and Billboards

- 12 W/ft<sup>2</sup> limit for internally illuminated signs
- 2.3 W/ft<sup>2</sup> for externally illuminated signs
- Alternate compliance if
  - Electronic ballasts
  - Efficient source: HPS, pulse start or ceramic MH, neon, cold cathode, LED, efficient fluorescent, or compact fluorescent

